REMARKS

This Amendment is in Response to the Final Rejection of June 24, 2010.

Claims 1-26 are cancelled in the application. New Claims 27-54 are pending. Favorable reconsideration of the application is respectfully requested.

Claim Objections

In view of the cancellation of claims 1-26 and the presentation of new claims it is respectfully submitted that the previous claim objections are now moot.

New Claims 27-54 Introduce No New Matter and Are Enabled By The Specification

The Examiner stated in the Interview Summary of August 31, 2010 and the Office Action of March 4, 2010 that Applicant's specification does not support claims in which there is no pressure regulator. The Examiner has also made inferences on how conventional mass flow controllers work to deliver a constant mass flow. (See, Interview Summary of August 31, 2010, " 'the absence of a pressure regulator' . . . would require explicit written support in the specification in order to avoid a new matter rejection . . . [and] a constant pressure is required to maintain a constant flow rate through a fixed aperture.")

It is respectfully submitted that the previous new matter rejections are improper in light of the full teachings of Applicant's specification. It is also respectfully submitted that the Examiner's previous inferences about the prior art are inapplicable in regards to the particular testing methodology taught in Applicant's specification. However, in the interests of advancing prosecution Applicant is submitting new claims to point out with greater clarity and particularity aspects of the claimed invention.

It is respectfully submitted that the new claims are fully supported by the specification such that no new matter is introduced. Moreover, it is further submitted that the new claims are fully enabled by the specification.

One aspect of the new claims is that Applicant has clarified that there are at least two different operating modes: a normal operating mode and a test operating mode related to mass flow test-related operations. Support for these limitations is found in paragraphs [0067]-[0069] and [0072].

The normal operating mode is the operating mode in which the mass flow rate is regulated. As described in Applicant's specification, the normal operating mode may, for example, be one in which a process gas with a controlled mass flow rate is provided to a downstream manufacturing process. One of ordinary skill in the art would understand that in the normal mode there is a flow signal indicative of mass flow rate that is monitored (e.g., a signal from a flow detector) and adjustments are made to the aperture of the valve to regulate the flow rate based on a target mass flow rate. (See, e.g., paragraph [0068] and related discussions regarding Figs. 17-18.)

The test mode is not used to deliver a fluid at a regulated mass flow rate. In the test mode, there is a relationship between pressure changes measured by the pressure detector and changes in the flow rate for a given aperture (See e.g., paragraphs [0089]- [0094]). That is, the pressure of the fluid received at the valve aperture of the flow controller is <u>unregulated</u> during key portions of the test mode and the mass flow rate correspondingly varies over time as the pressure drops over time. This would be understood by one of ordinary skill in the art from the mathematical relationships of paragraphs [0089]-[0096] and Figure 3. Paragraph [0096], for example, describes the relationship between aperture size, fluid pressure, and flow. Paragraph [0096], in light of the previous discussion in paragraphs [0089]-[0096], would be understood by one of ordinary skill in the art as contemplating a time-changing pressure at the (fixed) aperture and a corresponding time-changing variable flow rate during a measurement period of a test mode. This is further supported by Figures 3C-3E, which clearly illustrates that in the test mode a valve drive signal is fixed to select an aperture size of the valve (Fig. 3C)). Since the input valve is closed (Fig 3B), this results in the pressure signal decreasing over time as pressurized fluid stored in the accumulator exits via the flow control component (Fig. 3D). Since the aperture is fixed and the pressure is decreasing over time, this results in the flow rate measured by the flow detector decreasing over time (Fig. 3E).

It can be seen in Figure 3 that in the test mode there is a correlation between the temporal changes in pressure and the temporal changes in fluid flow. This, in turn, permits the pressure change characteristics to be used to calibrate the flow measurements performed in the normal operating mode. The test mode is carried out to verify whether precise flow control is maintained during normal operation and perform any required calibration. At some time prior to performing such tests, standard pressure change characteristics are stored as a standard. For example, when the device is shipped from the factory or set up in a destination site the pressure change characteristics may be measured for one or more valve drive signal settings (corresponding to an

aperture opening size). As one example, aperture size may be varied in increments, such as 10% increments, to generate different standard pressure change characteristics for a selected test gas, as discussed in paragraphs [0072], [0076]-[0078]. The verification process may similarly measure pressure changes over time for one or more apertures, such as 10% increments, as discussed in paragraphs [0084]-[0084]. The test pressure change characteristics are then compared to the standard pressure change characteristics (See paragraph [0086]). The deviations between the measure and standard pressure change characteristics may then be used to calibrate the mass flow detector.

Note that the specification contemplates, as one option, that the testing process may even be conducted using an inert gas/fluid, such as nitrogen and with a downstream vacuum applied. These options are described, for example, in paragraphs [0072], [0075], and [0079].

Rejections Under 35 U.S.C. § 102 & 103

All of the previous claims were rejected, variously, under 35 U.S.C. § 102 or 35 U.S.C. § 103 as being unpatentable over by *Ollivier* (USPN 6,450,200) or *Wilmer* (USPN 5,865,205) or combinations thereof.

It is respectfully submitted that the pending new claims describe patentable subject matter. The cited passages of the applied references simply fail to teach or suggest alone or in combination a test mode in which the pressure is unregulated at the flow control component, the aperture is fixed for at least one fixed aperture size (such that the mass flow will also vary over time as the pressure decreases at the valve aperture), and pressure change characteristics are measured to calibrate the flow control device for use in a normal operating mode.

Ollivier is directed to a fundamentally different technical approach than the claimed invention. Ollivier is directed to performing measurements **while maintaining "a controlled flow rate" as a process gas is continuously being delivered** (See col. 5, lines 54-67). Ollivier teaches regulating the pressure at the inlet of the mass flow controller using a pressure regulator 16. The Examiner has previously contended in the Final Rejection that this relationship implies a fixed aperture of the mass flow controller. However, this would require perfect pressure regulation, which is not taught in Ollivier. Additionally, even if the aperture in Ollivier is considered, for the sake of argument, to be fixed, it would be fixed at an aperture corresponding to delivering a constant controlled flow rate of a process gas during normal use. The flow rate in Ollivier is then calculated based on the <u>assumption</u> that there is a constant flow rate rather than a

time-varying variable flow rate (See, e.g., col. 5, line 30-col. 6, line 22). That is, the equations in Ollivier assume that a constant flow rate (Qsscm) is being delivered. There is no contemplation in Ollivier that the flow rate is **variable** during the measurement operation. Consequently, Ollivier performs a different measurement and a different calibration process than that described in the pending claims in which the flow rate for a fixed aperture varies over time as the pressure at the valve aperture decreases.

Another aspect of Ollivier is that its measurement process has many implicit limitations on pressure ranges of the reference capacity because the measurements are conducted while still delivering a constant mass flow rate. In Ollivier the input feed process gas from a supply line has some input pressure, such as 40-50 psi (col. 7, lines 13). When the valve 14 is open, the reference capacity of Ollivier is charged to this supply line pressure. The pressure regulator 16 sets a regulated output pressure, such as 10-15 psi (col. 7, lines 38). During any measurement period of Ollivier, the valve 14 is closed. This results in the pressure of the reference capacity dropping to some predetermined intermediate value, such as 20 psi (col. 7, lines 28-31). The pressure changes measured in Ollivier are with respect to locations upstream of the pressure regulator (See col. 7, lines 26-28). That is, the pressure regulator of Olliver always has on its input side a pressure greater than the regulated output pressure. This permits the pressure regulator to provide the mass flow controller with a regulated pressure such that the mass flow controller of Ollivier has a nearly constant pressure at its inlet (See col. 7, lines 4-6, 18-20, and 35-41). However, from these discussions it would be clear that Ollivier contemplates the measurements must occur over a limited range of pressures in the reference capacity. Also for a given process run it is only possible in Ollivier to calibrate the particular mass flow rate for the conditions of the process run.

Additionally, Ollivier also clearly describes some of the other disadvantages inherent to its measurement scheme. As one example, Ollivier discusses how conventional pressure regulators have non-ideal characteristics. That is, conventional pressure regulators do not perfectly regulate pressure. While a pressure regulator can be set to deliver gas at some nominal pressure (e.g., 10 psi) a pressure regulator may actually deliver a slightly different pressure than the nominal pressure setting. Ollivier discusses the problems of "pressure creep" and "droop" and describes how special high-performance pressure regulators only partially solve some of these problems (See col. 9, lines 39-47; col. 13, lines 4162; and col. 14, lines 29-37). Thus, one aspect of Ollivier is that it teaches that there are imperfections in pressure regulators and that even special high performance pressure regulators provide only a partial solution to these well-

known problems. One of ordinary skill in the art would thus understand that the pressure regulator in Ollivier could introduce additional measurement errors that would have to be accounted for during calibration. Additionally, since Ollivier performs measurement during normal delivery of the process gas, one of ordinary skill in the art would understand that other aspects of the gas delivery system may also affect the measurement accuracy in Ollivier.

Wilmer fails to remedy the deficiencies of Ollivier. For example, Wilmer discusses delivery of a gas during normal operation (Abstract) in which it would be understood that the valve aperture of the variable flow valve is <u>dynamically</u> varied during operation to maintain a constant flow rate (See e.g., col. 6, lines 22-50). However the cited passages of Wilmer do not discuss a separate test mode in which the pressure is unregulated at a fixed valve aperture of a flow control device and the flow rate correspondingly varies over time. Thus, Wilmer alone or in combination with Ollivier fails to teach or suggest all of the elements of the claimed invention. Therefore, Applicant submits that all pending claims are allowable over the cited art.

The dependent claims are allowable for at least the same reasons as their base claims and include additional limitations providing additional grounds for patentability.

As set forth in the remarks above, the Applicants believe that all claims currently pending are in condition for allowance, and should now be allowed. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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